28 Data Historian

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INTRODUCTION

Businesses are always looking for ways to continuously improve production efficiency and reduce wastes and errors within their operations. Information on the process, manufacturing, and production data is one of the key sources to make informed decisions.

Data historian is a software approach that collects and organizes data from plant into useful reports. By using data historian, businesses can identify plant deviations, supply regulations, and process conditions that lead to product defects. It helps to improve process times as well as reduce response time to faults. These can be done via collected data from plant floor that gives current production status and historical trends.

In many cases, historians represent the implementation of specific data management functionalities within the relevant packages. However, the historian has the capabilities to retrieve, contextualize, correlate, aggregate, and store process/row information for data services such as the quality assurance, reporting, certification, statistical analysis, and performance monitoring.

This chapter briefly discusses features and functionality of data historian as more information on the topic is presented in various chapters. Two commercial examples of data historian are provided to illustrate how data historian integrates in the supervisory control and data acquisition (SCADA), manufacturing execution system (MES), and enterprise resource planning (ERP). More information can be found in Chapter 44 and other related chapters in this book.

PERSPECTIVE VIEW AND FUNCTIONS OF DATA HISTORIAN

Data historian has been around for more than 30 years within process control. Figure 28.1 gives a brief history of data historian and its relations with MES. Early versions of data historians were historian centric having data storage as a premium importance and MES was mainly developed around the historian. But nowadays historian is mainly supported by MES and new standards open up many interface possibilities. At the moment, data storage is much cheaper and SQL historians are easily available.

The function of data historian is to collect, store, organize, and analyze the data. It presents the information in the form reports or to be accessed visually (Figure 28.2).
A brief explanation of the functions of data historian is as follow:

Data collector: Data historian interface mechanism for collecting data from data source(s), for example, SCADA for storage in the data historian system. This enables real-time access to historical and current data.

Historize: Data are gathered and archived. Some historians will provide options to users to select data to be archived either manually or automatically.

Store: Data are stored in the historian database immediately after these have been historized.

Organize: Data are sorted and organized into categories with data ID and time stamp. A user can search for data based on specific tag attributes, events, notification, date, or context.

Analysis: Data are turned into meaningful information thus allowing applications such as alarms, summarizations, statistical quality controls, and so on.

Notify: This enables notification to be delivered to a designated group. When a condition is met, a notification is triggered and forwarded to a designated group.

Visualize: The historian allows the production of a range of reports to view plant processes with embedded trends and alarms data that suit the reporting requirements.

Access portal: This allows data historian to be accessible via Microsoft Office system, ERP, Business intelligent system, MES, and so on.

INTEGRATION OF HISTORIAN ACTIVITIES AND EXAMPLES

Organizations might have already installed various information systems in place, including data historian. Figure 28.3

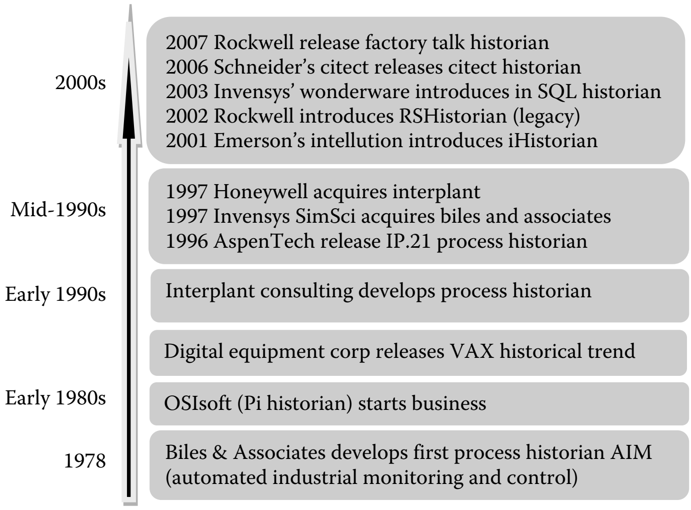

2000s
2007 Rockwell release factory talk historian
2006 Schneider's citect releases citect historian
2003 Invensys' wonderware introduces in SQL historian
2002 Rockwell introduces RSHistorian (legacy)
2001 Emerson's intellution introduces iHistorian
Mid-1990s
1997 Honeywell acquires interplant
1997 Invensys SimSci acquires biles and associates
1996 AspenTech release IP.21 process historian
Early 1990s
Interplant consulting develops process historian
Digital equipment corp releases VAX historical trend
Early 1980s
OSIsoft (Pi historian) starts business
1978
Biles & Associates develops first process historian AIM (automated industrial monitoring and control)

FIG. 28.1
Development of data historian.

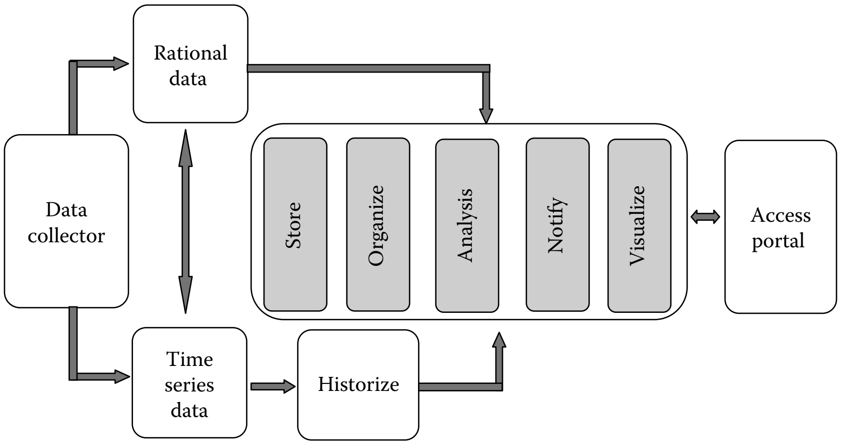


FIG. 28.2
Data historian functions.

shows typical system architecture of data historian integrating into an organization's business and operational processes. Two examples of data historians are provided below.

Example 28.1: CitectHistorian

CitectHistorian is an example of typical commercially available data historian. It comes in the form of two industry standard protocols for connecting to SCADA system and MES: the OPC DA client and the OPC HDA server. The OPC DA client is one of the protocols that this historian uses to collect data from any SCADA system. The OPC HDA server is the protocol to connect to MES.

Typically, this historian provides:

- Report such as a preconfigured alarm rationalization report based on the EEMUA (Engineering Equipment & Materials Users Association) 191 alarm management guidelines
- A process analysis function to enable the viewing of the processes with embedded trend and alarm data in an integrated display window

A screen shot of the report generated by the historian is illustrated in Figure 28.4.

A typical example of production analysis information is given in Figure 28.5.

CitectHistorian uses Microsoft SQL Server historian and includes the alarm management report based on EEMUA 191 guidelines.

Example 28.2: Siemens SIMATIC IT

SIMATIC IT historian is an aggregation of software components that collect, contextualize, correlate, and store information. Figure 28.6 shows the data flow of the process through individual software components.

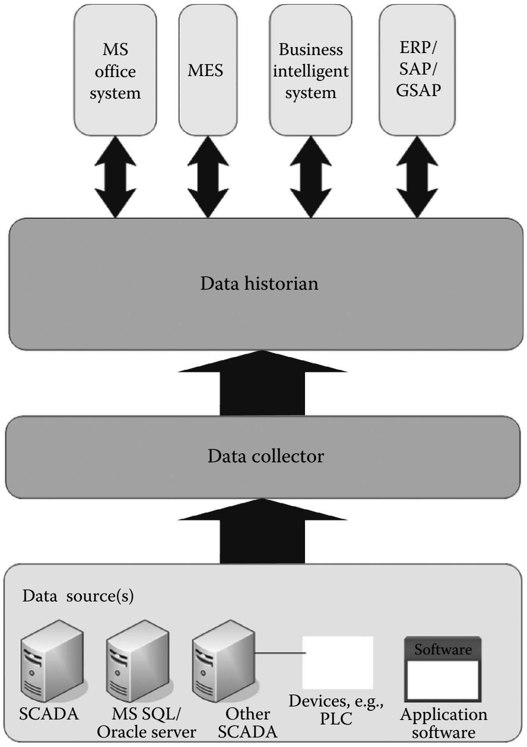


FIG. 28.3
Integration of data historian integration within an organization.

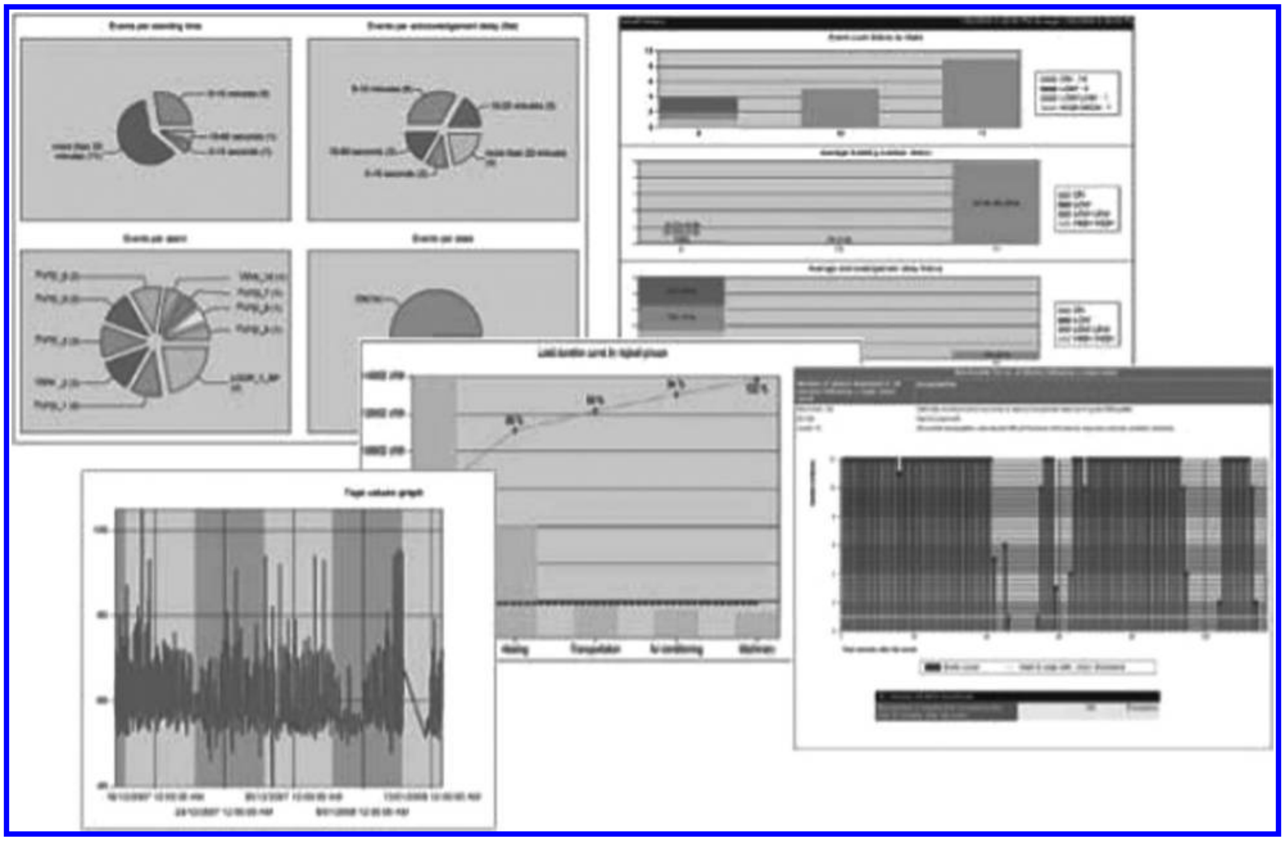
In a typical application, the data are collected from many stations, each representing different production areas of a plant as shown in Figure 28.7.

In each station there are units that are responsible for behaving as a buffer memory in which the data can be written to. All the data or part of it can then be sent to a database for archiving for later use as the need occurs.

CONCLUSIONS

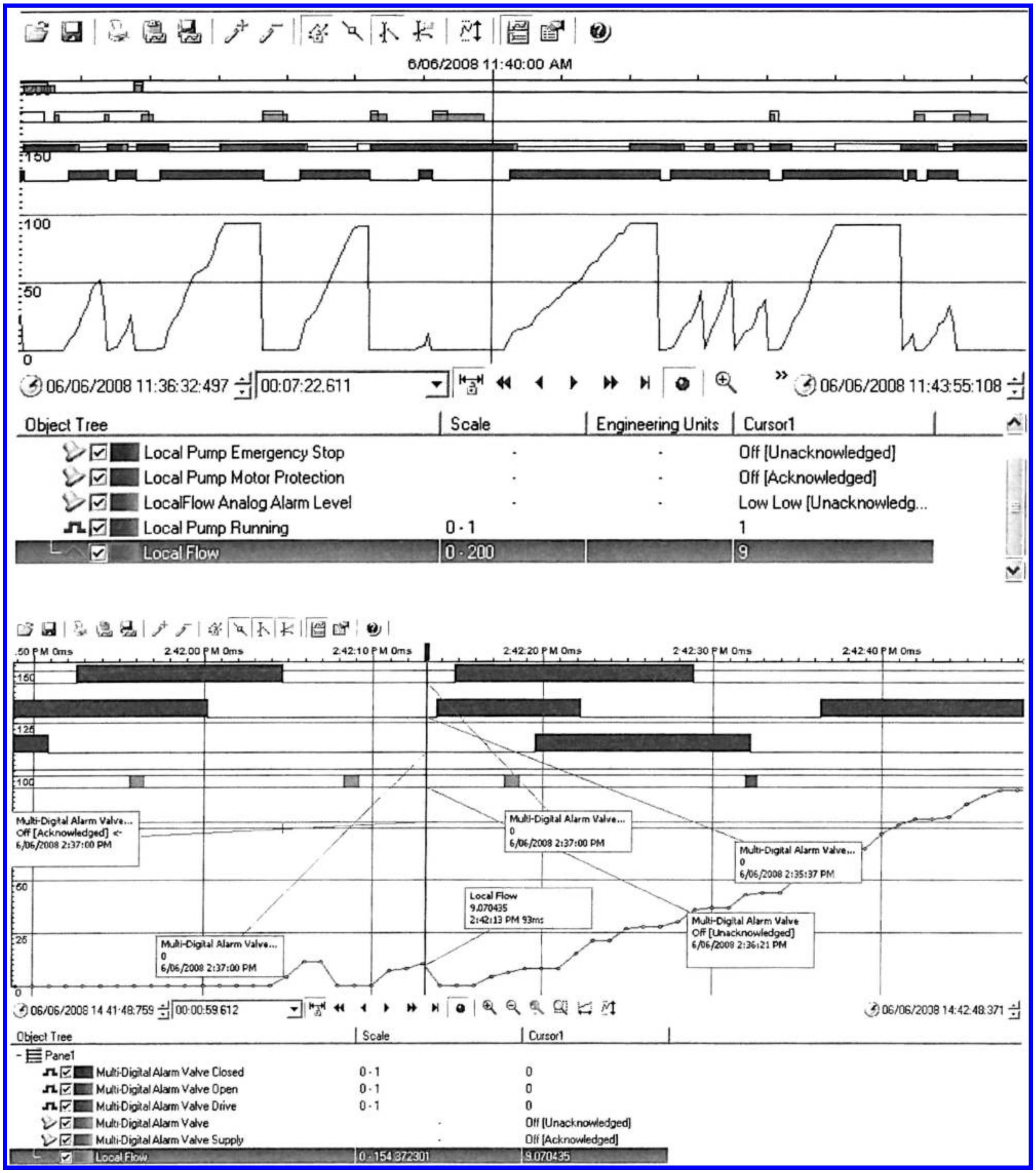
The global market has shifted toward data to be rolled up into a centralized enterprise-wide historian for production reporting and ERP integration and provide one point of accessibility for business group to view and use production data. This allows data historian vendors to reengineer its product to be able to

- Integrate with a wide variety of process control and DCS environments to source and "write back" process control data
- Allow data replication and consolidation to one location from a variety of locations and control system



Alarm rationalization and alarm management reports (EEMUA 191 guidelines)

FIG. 28.4
Example reports generated by CitectHistorian.



06/06/2008 11:36:32.497 00:07:22.611 06/06/2008 11:43:55.108

Object Tree	Scale	Engineering Units	Cursor1
☑ Local Pump Emergency Stop	-	-	Off [Unacknowledged]
☑ Local Pump Motor Protection	-	-	Off [Acknowledged]
☑ LocalFlow Analog Alarm Level	-	-	Low Low [Unacknowledg...
☑ Local Pump Running	0 - 1		1
☑ Local Flow	0 - 200		9

06/06/2008 14 41:48.759 00:00:59.612 06/06/2008 14:42:48.371

Object Tree	Scale	Cursor1
- Pane1		
☑ Multi-Digital Alarm Valve Closed	0 - 1	0
☑ Multi-Digital Alarm Valve Open	0 - 1	0
☑ Multi-Digital Alarm Valve Drive	0 - 1	0
☑ Multi-Digital Alarm Valve	-	Off [Unacknowledged]
☑ Multi-Digital Alarm Valve Supply	-	Off [Acknowledged]
☑ Local Flow	0 - 154.372301	9.070435

FIG. 28.5
Typical production analysis.

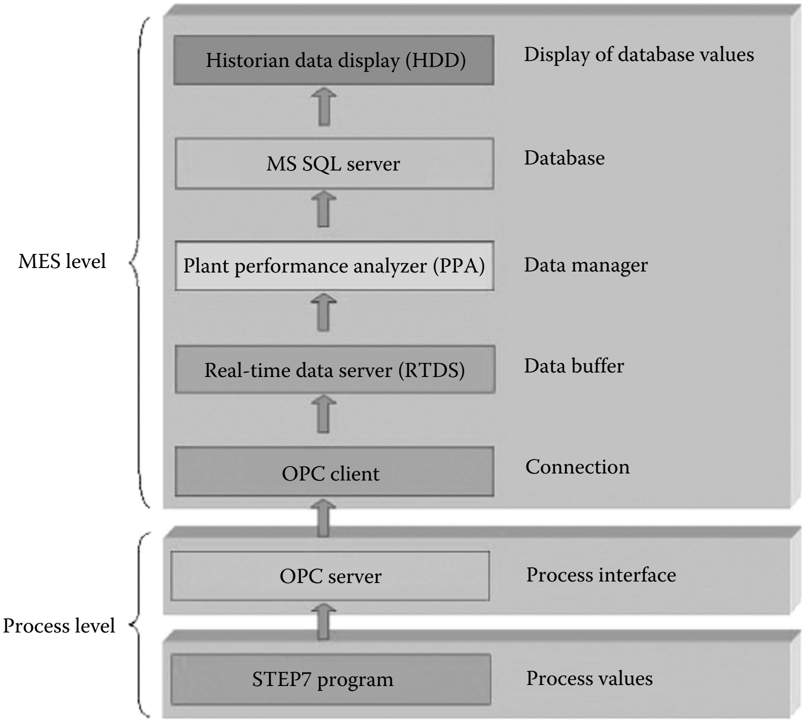


FIG. 28.6
Flow of data through individual components.

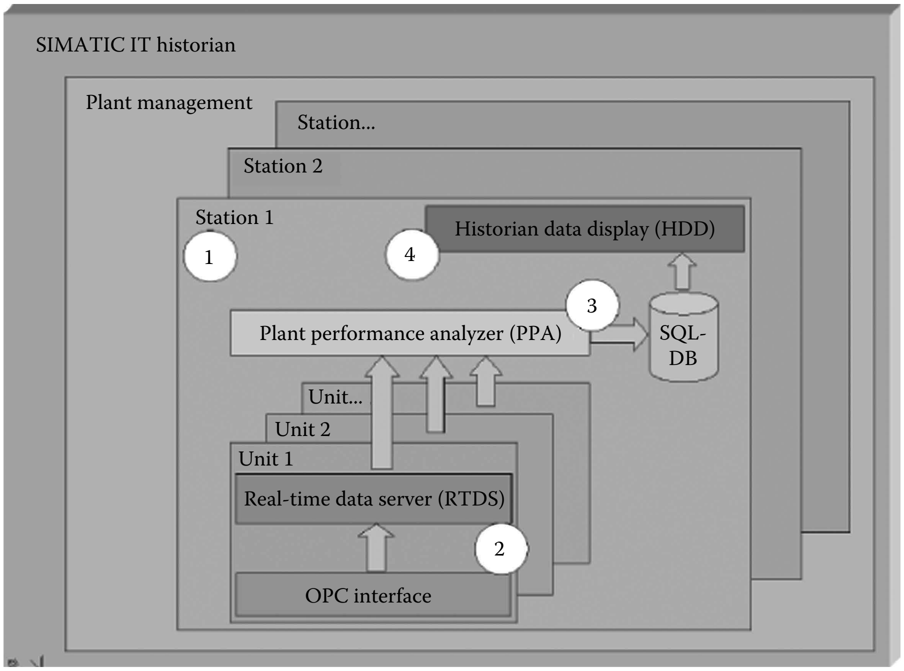


FIG. 28.7
Example of structural display of historian.

- Provide reliable, robust, redundant data collection capabilities to eliminate the loss of production data due to an outage from network, server, or software failure in either the process control or the MES environment
- Provide fast and reliable data recovery after an extended outage that ensures there are no gaps or loss of data

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